~~Designation:D6126–97(Reapproved 2003)ε1~~ **Designation: D6126 – 11**

Standard Specification for HFC-23 (Trifluoromethane, CHF_3)[1]

This standard is issued under the fixed designation D6126; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

~~ε[1] NOTE—Editorial changes were made in December 2003.~~

1. Scope

1.1 This specification covers the requirements for HFC-23 as a fire fighting medium.

1.2 This specification does not address the fire fighting equipment or hardware that employs HFC-23 or the conditions of employing such equipment (for example: handshields, fixed installations, etc.).

1.3 This specification does not address the storage or transportation of HFC-23 Storage handling, and transportation issues are addressed in Practice D6127.

1.4 The values stated in both inch-pound and SI units are to be regarded separately as the standard. The values given in parentheses are for information only.

1.5 The following safety hazards caveat pertains to the test methods portion, Section 6, of this specification: *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ~~*ASTM Standards:*~~

~~D4081 Specification for Drycleaning-Grade Perchloroethylene~~ ASTM Standards:[2]

D6127 Practice for Handling, Transportation, and Storage of HFC-23 (Trifluoromethane, CHF_3~~)~~)

D6806 Practice for Analysis of Halogenated Organic Solvents and Their Admixtures by Gas Chromatography

2.2 *ISO Standards:*

~~ISO 3363 Fluorinated Hydrocarbons for Industrial Use - Determination of Acidity - Titration Method~~

~~ISO 3427 Gaseous Halogenated Hydrocarbons (Liquefied Gases) - Taking a Sample[3]~~

~~ISO 5789 Fluorinated Hydrocarbons for Industrial Use - Determination of Nonvolatile Residue[3]~~

ISO 3427 Gaseous Halogenated Hydrocarbons (Liquefied Gases) - Taking a Sample[3]

2.3 ~~*CGA Standards:*~~

~~No. C-4, American National Standard Method of Marking Portable Compressed Gas Containers to Identify the Material Contained~~

~~No. P-1, Safe Handling of Compressed Gases in Containers[4]~~ ARI Standards:[4]

2008 Appendix C Analytical Procedures for ARI Standard 700-2006

2.4 *U.S. ~~Governmental~~Government Standards:*

Code of Federal Regulations (CFR) Title 49, Part 172.101 Tables of Hazardous Materials and Special Provisions[5]

~~DOT-E 9491, Exception to Code of Federal Regulations (CFR) Title 49, Part 173.302 and Part 173.304[5]~~

~~Code of Federal Regulations (CFR) Title 49, Part 173.302 and 173.304 Preparation and Packaging of Gases[5]~~

~~Code of Federal Regulations (CFR) Title 49, Part 172 Sub D Marking Requirements of Packaging for Transportation[5]~~

Code of Federal Regulations (CFR) Title 49, Part 172 Sub D Marking Requirements of Packaging for Transportation[5]

2.5 *American Society of Refrigeration Engineers:*

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[1] This specification is under the jurisdiction of ASTM Committee D26 on Halogenated Organic Solvents and Fire Extinguishing Agents and is the direct responsibility of Subcommittee D26.09 ~~on Halogenated Fire Extinguishants.~~

~~Current edition approved May 10, 1997. Published June 1998. DOI: 10.1520/D6126-97R03E01.~~on Fire Extinguishing Agents.

Current edition approved Jan. 1, 2011. Published August 2011. Originally approved in 1997. Last previous edition approved in 2003 as D6126 - 97(2003)ε1 . DOI: 10.1520/D6126-11.

[2] For referenced ASTM standards, visit the ASTM website, www.astm.org, or contact ASTM Customer Service at service@astm.org. For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

[3] Available from American National Standards Institute, 11 W. 42nd St., 13th Floor, New York, NY 10036.

~~[4] Available from the Compressed Gas Association.~~

[4] Available from the Air Conditioning, Heating and Refrigeration Institute, 4100 North Fairfax Drive, Suite 200, Arlington, VA, 22203-1678.

[5] Available from Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20036.

ASRE Standard 34, Designation of Refrigerants[6]

3. Terminology

3.1 *Definitions of Terms Specific to This Standard:*

3.1.1 *halogenated hydrocarbon*—the halogenated compound coding terminology system provides a convenient means to reference halogenated hydrocarbons, ASRE 34. Halogenated hydrocarbons are saturated hydrocarbons in which one or more of the hydrogen atoms have been replaced by atoms of the halogen series (fluorine, chlorine, bromine, and iodine). It is convention to prefix the number with an abbreviation of the compound:

CFC = chlorofluorocarbon
HCFC = hydrochlorofluorocarbon
HFC = hydrofluorocarbon
FC = fluorocarbon
R = refrigerant

3.1.1.1 *Discussion*—By definitions, the right most digit of the numbering system is the number of fluorine atoms.

3.1.1.2 *Discussion*—The second digit from the right is the number of hydrogen atoms plus one (+1).

3.1.1.3 *Discussion*—The third digit from the right is one less (-1) than number of carbon atoms in the compound (when this number is zero (0) it is omitted from the number.

3.1.1.4 *Discussion*—Unaccounted for valance requirements are assumed to be chlorine atoms.

3.1.1.5 *Discussion*—When the compound contains bromine or iodine, the same rules apply except the letter "B" for bromine or "I" for iodine follows the parent compound designated number and the number of the atoms is placed after the letter.

3.1.1.6 *Discussion—Example*—CHF_3= R-23 = HFC-23.

3.1.2 *HFC-23* —the compound trifluoromethane; CHF_3.

4. Material Requirements

4.1 Nitrogen (N_2) partial pressure is not required for this product, it is shipped neat. The saturated vapor pressure of HFC-23 is 42 bars at 21°C (610 psig at 70°F). HFC-23 has a critical temperature of 25.9°C (78.6°F). The filling density should be that which will not liquid fill the container at temperatures below 25.9°C (78.6°F) or exceed 5/4 the pressure rating of the container at 130 °F. For example, the U.S. DOT 3AL cylinder with a minimum working pressure of 1800 psig shall not exceed 42 bar at 21°C (610 psig at 70°F) for a maximum filling density of 84.4 %. For this example the cylinder pressure is 141 bars at 54°C (2045 psig at 130°F).

4.1.1 HFC-23 shall conform to the requirements prescribed in Table 1 when tested by the appropriate test method(s) listed in Section 6.

4.1.2 When material analysis is required, by agreement between the purchaser and the supplier, the total pressure in the HFC-23 container, the fill density of the HFC-23 within the container, and the maximum safe storage temperature shall be part of the material analysis (certification). The pressure shall be reported in bar (preferred) or pound-force per square inch gage (psig). The fill density shall be reported in kilograms per cubic metre at 21°C (preferred) or pounds per cubic foot at 70°F. The maximum safe storage temperature of the HFC-23 shall be reported in degrees Celsius (preferred) or in degrees Fahrenheit and shall conform to the applicable regulations for the HFC-23 container design and use.

4.2 By agreement between the purchaser and the supplier, analysis may be required and limits established for elements or compounds not specified in Table 1.

4.3 *Product Requirements*—See Table 1.

5. Sampling

5.1 Samples of HFC-23, taken from the liquid phase, shall be taken from filled containers in accordance with the method specified in ISO 3427. The sampling bottle shall be capable of safely resisting the vapor pressure of the sample at the highest temperature that could be encountered.

[6] Available from American Society of Refrigeration Engineers, Refrigeration Engineering 65. 49 (1957).

TABLE 1 Requirements

Property	Requirement
HFC-23 purity, %, mol/mol, max	99.0
Acidity, ppm by mass, as HCl, max	3.0
Water content, ppm by mass, max	10
Nonvolatile residue, % by weight, max	0.08
Suspended matter or sediment	none visible